VII. *Some* Thoughts *and* Experiments *concerning* Electricity, *by* J. T. Deſaguliers, *LL. D.* F. R. S.

THE *Phænomena* of Electricity are ſo odd, that though we have a great many Experiments upon that Subject; we have not yet been able from their Compariſon to ſettle ſuch a Theory as to lead us to the Cauſe of that Property of Bodies, or even to judge of all its Effects, or find out what uſeful Influence Electricity has in Nature: Though certainly, from what we have ſeen of it, we may conjecture, that it muſt be of great Uſe, becauſe it is ſo extenſive.

Though ſome Perſons have been too haſty in their Conjectures, and too apt to run into Hypotheſes not ſufficiently ſupported by Experiments; yet it would be of great Uſe to ſettle ſome general Propoſitions concerning Electricity from the Light we have already, and what we may further diſcover by future Experiments; provided we have a ſufficient Number of them to ſettle a general Rule. For Example; I now propoſe ſome general Aſſertions to be conſider'd, and to be rejected or allowed of as a Number of Experiments ſhall determine; but to ſtand only as *Queries* till they are ſettled.

I have hitherto avoided entertaining the SOCIETY upon this Subject, or purſuing it ſo far as I might have done, (conſidering that I can excite as ſtrong an Electricity in Glaſs, by rubbing it with my Hand, as any body can) becauſe I was unwilling to interfere with

with the late Mr. *Stephen Gray*, who had wholly turn'd his Thoughts that way; but was of a Temper to give it intirely over, if he imagin'd, that any thing was done in Oppoſition to him. But now I intend not only to go on myſelf in making electrical Experiments, but ſhall always be ready to make ſuch as ſhall be propoſed by any Member of the SOCIETY. The *Queries* which I have already examin'd, are the following:

Query I. Whether all Bodies in general are not capable of receiving the Electricity which has been given to a Tube by Friction, though there be a great many Bodies, ſuch as Metals and Vegetables, *&c.* in which we have not hitherto been able to excite any Electricity by Heat, or Friction, or any other Operation on the Bodies themſelves?

Query II. Whether when a String is ſtretch'd out at Length, with a Body hanging at one End of it, to which Body we would communicate the Electricity of the Tube rubb'd at the other End, the Supporters of the String ought not to be of ſuch Bodies as are capable of having Electricity excited in them by Friction, Heating, Beating, or Patting, or ſome immediate Operation on the Bodies themſelves?

Query III. Whether theſe Supporters of the String (mention'd in the laſt *Query*) which ſtops the electrical Virtue from paſſing any farther, are not of ſuch a kind as are incapable of having the electrical Virtue excited in them immediately by any Operation yet known; though they are all capable of receiving it from a rubb'd Tube, even at a great Diſtance, by the Communication of a String made of vegetable Subſtances?

Query IV. Whether the Reaſon that ſome Supporters tranſmit the Electricity running from the rubb'd Tube along the String to Bodies beyond them, be not as follows, *viz.* That having receiv'd ſome of the electrical Stream, they ſoon become ſaturated with it, and ſo receiving no more of it, let the reſt paſs on without diſturbing it?

Query V. Whether the Reaſon, that Supporters made of vegetable Subſtances, Metals, and ſuch others, as ſtop the Electricity above-mention'd from running any farther along the String than the Place where it reſts upon them, be not this? *viz.* That they are never ſaturated with the electrical Stream, but continually receive it, and tranſmit it to the next contiguous Body, provided that contiguous Body be of the ſame kind with themſelves, and alſo contiguous to other Bodies of the ſame ſort: I mean ſuch as would ſtop the Electricity, if the String was ſupported by them. For even theſe Supporters will tranſmit the Electricity, if terminated at each End by Bodies that tranſmit the Electricity, when they ſupport the String.

Query VI. Whether we may not diſtinguiſh all Bodies in general, in reſpect of Electricity, into ſuch as may be excited to Electricity, and ſuch as cannot be excited to Electricity? the two kind of Bodies receiving the Electricity from other Bodies into which it has been excited differently; the firſt alſo tranſmitting the Electricity, while the others do not.

Theſe *Queries* are ſuch as ariſe from a Conſideration of Experiments made by others, and ſuch as I have made myſelf.

As I go on in making other Experiments, other *Queries* may ariſe, and I ſhall communicate them.

Here follow the Experiments I have already made, and am ready to repeat as the SOCIETY may deſire.

EXPERIMENTS *relating to the Firſt Query.*

I ſtretch'd a Cat-gut about five Feet in Length, and faſten'd it to the Top of two Chairs in an horizontal Situation, and ſuch another Cat-gut String to two other Chairs parallel to the firſt, and at the Diſtance of 15 or 20 Feet from the former. Then I ſuſpended one End of a Packthread to the Middle of the firſt Cat-gut, and carried it on ſo as to lay it over the Middle of the other Cat-gut, and leave the other End of the Packthread hanging down about a Foot below the Cat-gut, with a Loop to hang ſeveral Bodies to it, ſucceſſively to receive the Electricity excited by the Tube, and applied to the other End of the Packthread.

All the Bodies I tried received the Electricity communicated from the rubb'd Tube along the String, which appear'd by holding a Thread faſten'd to a Stick, the Thread being attracted towards the ſuſpended Body

1. A Gold Medal. 2. A Silver Medal. 3. A Copper Medal. 4. A Braſs Ball. 5. A Steel Ball. 6. A Tin Ball. 7. A Leaden Ball. 8. Sulphur. 9. Sealing-Wax. 10. Pumice-Stone. 11. Bees-Wax. 12. Reſin. 13. *Sal Armoniac.* 14. Ivory. 15. Human Bone. 16. Fiſh-Skin. 17. Loadſtone. 18. Fleſh. 19. Cotton. 20. Wax-Candle. 21. Tallow-Candle. 22. A Leak. 23. Celeri. 24. To-

bacco-

bacco-Pipe. 25. A Glaſs-Ball. 26. A Ruſh rolled up.

EXPERIMENTS *relating to Query* II.

Retaining the firſt ſupporting String of Cat-gut, inſtead of the laſt Cat-gut Supporter, I made the Packthread paſs over the following Subſtances ſucceſſively, all which tranſmitted the Electricity to the Body ſuſpended at the End of the Packthread; *viz.* 1. A Silk String. 2. Hair Rope. 3. Parchment. 4. A Thong of Sheep-skin, but it ſtopp'd the Electricity till it was dry and warm. 5. A Liſt of Woollen Cloth. 6. A Liſt of Flanel. 7. Cadis, or a kind of Worſted Tape. 8. Quills. 9. Whalebone. 10. A Man's Thigh-Bone. 11. A Bladder. 12. A Cat, held between two. 13. A Tallow-Candle. 14. A Wax-Candle (the String was alſo laid over the unburn'd Cotton Wick at the End of the Candle). 15. A Tallow-Candle and its Wick. 16. Tobacco-Pipe, with a Cat-gut or a Packthread through it, or without, that is, a Packthread String being faſten'd at each End of it. 17. A Sword-Belt. 18. A Piece of a white Hat. 19. A Piece of a black Hat. 20. A Glaſs Tube. 21. The ſame with Water in it. 22. With Spirit of Wine. 23. The ſame with Mercury in it. 24. Sealing-Wax. 25. Crape.

N. B. All theſe Subſtances, except the Sheep-skin, the Tobacco-Pipe, the Quills, the Candles, and the Bone, not only tranſmitted the Electricity, but became ſo far electrical, as to attract the Thread a little way on each Side of the ſupported Packthread.

There are more Experiments requir'd to be made, before this *Query* can be turn'd into an Aſſertion.

EXPERIMENTS *relating to Query* III.

Inſtead of the laſt Supporter of Cat-gut near the ſuſpended Body, I made uſe of the following Subſtances ſtretch'd from Chair to Chair; and then the Thread hanging on the Stick was not at all attracted by the ſuſpended Ivory Ball, which I made uſe of in all the Experiments to try the Supporters.

1. A Hempen Rope. 2. A ſmall Packthread. 3. A drawn Sword. 4. A Sword in the Scabbard. 5. The Scabbard without the Sword. 6. A twiſted Cotton Thread. 7. Tape made of Thread. 8. Bars, Tubes and Wires of Copper, Braſs, Iron and Lead. 9. White Paper and brown. 10. A moiſt Thong of Sheep-Skin. 11. Celeri. 12. Leeks. 13. Fir-wood. 14. A Cane. 15. A Piece of black Thorn. 16. The ſame Ruſhes that had before receiv'd the Electricity when ſuſpended. 17. A Spunge dry. 18. White Thread. 19. Hay. 20. A Marble Slab.

N. B. Such Bodies as were too ſhort to reach from Chair to Chair, were lengthen'd out by Pieces of Packthread at each End.

EXPERIMENTS *relating to Query* IV.

The Cat-gut Supporters, and all the others mention'd in the Experiments to *Query* III. which tranſmitted the Electricity, attracted the Thread of the Stick near the conducting Packthread, but not ſo far as the Chairs to which the ſaid Supporters were faſten'd.

EXPERIMENTS *relating to Query* V.

All the Supporters which did not tranſmit the Electricity, when they reach'd from Chair to Chair, were made to tranſmit, when they were lengthen'd out with Cat-gut at each End, and then they became electrical themſelves from one End to the other, as becoming part of the ſuſpended Body; and becoming ſo ſaturated, as not to be able to carry the Electricity on either Side any farther than the Cat-gut to which they were faſten'd.

EXPERIMENTS *relating to Query* VI.

The late Mr. *Stephen Gray* has, by rubbing, excited Electricity in ſeveral of thoſe Bodies which I have made Supporters of to tranſmit the Electricity (See *Philoſoph. Tranſ.* N° 366.): I have done the ſame with ſeveral others, but not with all of them, though I ſhall try them all: But as it is more difficult to excite that Virtue in ſome than others; and all the Experiments in general ſucceed better in dry and cold Weather than in moiſt and warm, I muſt wait for proper Opportunities to make the Experiments, and then I ſhall communicate them.

EXPERIMENTS *concerning mix'd Subſtances.*

1. Cadis (or Woollen Tape) laid on Thread-Tape, when made a Supporter, tranſmitted the Electricity.

2. When the Thread-Tape was uppermoſt, the Electricity was ſtopp'd.

3. When they were twiſted together, the Electricity was tranſmitted, but moſt weakly when the Pack-

thread going to the Ball was laid over that Part of the Twiſt which had the Thread-Tape.

N. B. The two Paper Supporters which did not tranſmit the Electricity, ought to have done it according to *Query* II. becauſe, by Mr. *Gray*'s Experiments, Electricity is to be excited in the Paper by rubbing: Therefore, perhaps, the Papers wanted to be drier or warmer, ſo that I ſhall try them again. Theſe are the only two Experiments that do not agree with the ſecond *Query*; but I would not omit mentioning them, becauſe it is the Part of an impartial Philoſopher to mention as well thoſe things which favour, as thoſe that diſagree with his Hypotheſes and Conjectures.

VIII. EXPERIMENTS *made before the* ROYAL SOCIETY, Feb. 2. 1737-8. *by* J. T. Deſaguliers, *LL. D.* F. R. S.

N. B. IN the following Account, which is the Sequel of former Experiments, I call *Conductors* thoſe Strings, to one End of which the rubb'd Tube is applied; and *Supporters* ſuch horizontal Bodies as the *Conductor* reſts upon.

EXPERIMENT I.

Old Packthread Supporters tranſmitted Electricity but weakly, though more ſtrongly when twiſted with Cat-gut; but new Packthread did better.

N. B. *Where it is not mention'd otherwiſe, an Ivory Ball hangs at the End of the* Conductor; *and*